Stakeholder feedback

Leveraging insights yielded from extensive industry consultation, the NSW Department of Industry has developed a Government-led and industry-driven Strategy to grow the NSW Advanced Manufacturing industry. The component parts of this Strategy, detailed below, collectively seek to harness the existing skills and capabilities within NSW to develop and position NSW as a globally competitive Advanced Manufacturing market. The table below outlines the strategies underpinning the focus areas to enable the growth of the Advanced Manufacturing Industry in NSW. We welcome the feedback provided by stakeholders. Please use the table below to provide comment.

General Comments

Thank you for the opportunity to provide feedback on the NSW Government's draft Advanced Manufacturing Industry Development Strategy.

Engineers Australia is the peak body of the engineering profession. We are a member-based professional association with over 100,000 individual members. Established in 1919, Engineers Australia is a not-for-profit organisation, constituted by Royal Charter to advance the science and practice of engineering for the benefit of the community. Learn more about the association here: https://www.engineersaustralia.org.au.

This submission addresses Priority 1 for Advanced Knowledge, with all comments attached to Item 2 of that priority. At the end of this submission, some general comment on the Key Performance Indicators are also provided.

If further information is needed, we would be pleased to meet with the Department of Industry in February 2018 to go into more detail.

To discuss this submission further please contact Jonathan Russell, National Manager for Public Affairs, on (02) 6270 6565 or at JRussell@engineersaustralia.org.au.

If you would like to comment on specific sections please fill out the feedback form below:

Focus Area	Strategy	Are you a partner organisation?	Comment
Advanced Knowledge			
1. Increase collaboration between government, industry and academia to information share and build industry capability	Drive collaboration across the advanced manufacturing ecosystem		
	Investigate establishing advanced manufacturing Living Lab and/ or Hub in NSW in partnership with the Commonwealth Department of Industry and AMGC		
	Organise and support informal networking events for NSW-based manufacturers, researchers and large manufacturing companies that improve knowledge-sharing about market trends and business opportunities		

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	Organise and support open days/information forums at Australian universities and research organisations		
	Best Practice speaker series, modelled on the successful Lean Manufacturing program in the Central West/Orange region of NSW (offering a series of workshops for local manufacturers)		
	Academic speaker series (inviting leading Australian and global researchers to brief a select group of NSW manufacturers on latest projects and innovations), leveraging the Visitor Entrepreneur Program and the US Studies Centre, attached the University of Sydney		
2. Skills for the advanced manufacturing jobs of the future – focussing on education, qualifications and increasing skills intensity	DoI (ID lead; with Training Services NSW, PEA, Department of Education) will work with key partners to identify the nature of the skills gap in NSW advanced manufacturing	Engineers Australia accredits all university-level, and some VET-level, engineering programs in Australia. It is therefore a key stakeholder—or partner organisation—for the NSW Government as it works to ensure there are enough people with appropriate engineering skills in the state. More information is available here: http://bit.ly/2kQHCKe. Furthermore, we provide a voluntary registration scheme for engineers which enables employers to identify suitably qualified and experienced engineers for their businesses. A comprehensive registration scheme for engineers in NSW has a wide range of other benefits and we would welcome an opportunity	The following comments address the draft Strategy goal of identifying the nature of the skills gap in NSW advanced manufacturing. This includes information about the supply of engineers, current employment opportunities and the changing nature of employment for engineers in manufacturing. **The supply of engineers** The supply of engineers has a trend for being counter-cyclical to demand. This leads to several negative outcomes: low periods of demand that exhibit poor employment opportunities for graduates and redundancies for others, followed by a dearth of experienced engineers when work picks up and a consequent reliance on skilled migration to plug the skills gap. The counter-cyclical trend is not merely a matter for the profession. There are associated economic costs borne by the community under both undersupply and over supply scenarios. For example, in undersupply scenarios the cost of labour goes up, and projects reliant on engineering are delayed or completed with significant inefficiencies. In oversupply scenarios the benefits of investment in education are lost when graduates cannot attain work and there is often a 'brain drain' as well qualified and experienced professionals seek employment overseas. Government can help break this cycle (and provide confidence to young men and women considering an engineering qualification and career) by providing long and stable pipelines of engineering-intensive work such as public infrastructure, coupled with

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		to discuss these with the Department. More information is available here: http://bit.ly/2BBksQ3. Finally, Engineers Australia is the largest provider of Continuous Professional Development (CPD) to the engineering profession. This includes through our training division, Engineering Education Australia (http://eeaust.com.au).	policies that support engineering-intensive industries like manufacturing, energy and utilities. Engineers Australia supports the intent of the draft Strategy to help companies to understand that employing people with engineering and other STEM qualifications is essential for realising goals of being innovative and taking advantage of advanced manufacturing principles. Until December 2012 the conventional wisdom was that Australia had an engineering shortage. The collapse in engineering jobs put an end to this view over the subsequent 30 months and brought with it a major adjustment in the engineering labour market. Commencements in engineering entry level courses by domestic students have fallen in three successive years and the rate of decline has been accelerating. At this stage there are no signs that this trend will end. The duration of most entry level courses has meant that completions of these courses have continued to increase but, in 2016, the annual rate of increase slowed abruptly suggesting that the commencement trend will soon show up in falling entry level completions. Another facet of adjustment in the engineering labour market is that fewer domestic students are undertaking post graduate studies in engineering. This change lagged the downturn in entry level commencements by a year but is now well entrenched. The representation of women in entry level courses continues to inch upwards reversing a deterioration over the first few years of this decade. But with 14.4% representation of women in entry level completions in 2016, gender balance is as far away as ever. Consistent with previous years, the representation of women in post graduate studies in engineering is much higher; 20.2% of post graduate course completions were women. **Current opportunities for engineers in NSW (across all disciplines)** New South Wales has consistently recorded the highest number of engineering vacancies of all states in Australia for the last two years. However, the message from job vacancy data does not indicate that there is a large demand for engineering in advanced manufacturing. Instead, it appears that most engineering vacancies are driven by public infrastructure investment. Job vacancies can provide a valuable gauge of the state of the labour market as vacancies are a key indicator of unmet demand for labour in the economy. The data provided here is derived from the Australian Government Department of Employment September 2017 Vacancies Report. Engineers Australia's full analysis of this report is available online and includes national and state-by-state comparisons: http://bit.ly/2ABq7op. Engineering vacancy growth trends in NSW have consistently been higher than overall NSW vacancies for the last two years. Over the last 12 months total NSW vacancy numbers have grown by 2.1%, compared to 12.3% for NSW engineering vacancies over the same time period. However, the growth seen over 2016 has steadied in 2017 and fallen slightly over the course of the last few months, recording a fall of 1.4% over the last nine months. In January 2017 there was 1,283 vacancies recorded for engineers, which fell slightly to 1,265 vacancies recorded in September 2017.

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			Engineering vacancy numbers in NSW are dominated by vacancies recorded in Civil engineering occupations, which make up roughly two-thirds of all engineering vacancies in the state. Some points of note in NSW are: • Civil engineering occupations continue to drive the increasing numbers in NSW engineering vacancies, growing strongly in 2016, and the first few months of 2017 before slowing in recent months. In September 2015 there was 587 vacancies recorded, which grew to 911 recorded in July 2017. In recent months this has dropped back down to 863 recorded in September 2017. There have been a number of major infrastructure projects in the state which could have contributed to some of this growth in recent times such as the Sydney Rapid Transit Project, the WestConnex Project and the Regional Road Freight Corridor Project. • Industrial and mechanical engineering occupations have grown slightly over the last two years, with the biggest growth occurring during mid-2016, before tracking at a steady rate over the first nine months of 2017. In January 2016 there was 126 vacancies recorded which grew to 173 in January 2017, and pushing slightly higher to 184 recorded in September 2017. • Electrical engineering occupations have also seen growth in vacancy numbers recorded during 2016, showing some higher growth during the middle of 2017 and falling away slightly in recent months. In January 2016 there were 48 vacancies recorded for electrical engineers in NSW, growing to 95 in January 2017. In July there were 120 recorded, before falling down to 92 in September 2017. • Engineering manager occupation vacancies have remained reasonably steady in NSW. In January 2016 there was 42 recorded, compared to 46 recorded a year later. In September 2017, this has grown slightly to 58 recorded. • Vacancies for mining engineers in NSW have grown slightly over the two-year period. In September 2015 there were 36 vacancies for mining engineers, growing to 54 vacancies in September 2017. • Vacancies for telecommunications engineers have remained steady over the past 12 months, hovering between 30 and 40 vacancies recorded in a month. • Electronics and chemical and materials have consistently remained the two occupations with the lowest vacancy number in the state. Electronics engineering vacancies have grown in the last nine months from 9 vacancies in January to 14 in September, while chemical and materials vacancies have remained in single figures each month. **Engineers in manufacturing** The engineering profession associated with the manufacturing sector is going through a period of adjustment. Census data from 2006, 2011 and 2016 shows a range of trends depending on the subsector examined. Data for the manufacturing sub-sectors of (a) primary metal, (b) transport equipment, (c) machinery and equipment, (d) food product, and (e) basic chemical and chemical product manufacturing show that all had an increase in engineers employed between the 2006

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			and 2011 census. However, between 2011 and 2016, only the latter two continued to increase their employment of engineers, with all others falling—sometimes dramatically. In determining the nature of the skills gap in NSW advanced manufacturing, it will be important for the NSW Government to find out why some sub-sectors are reducing the number of engineers employed. More importantly, the skills gap analysis should determine if those no longer working in areas such as metal, transport and machinery manufacturing are leaving the workforce permanently or are being retrained and redeployed to companies or sub-sectors that are more reflective of 'advanced manufacturing.' The NSW Government's draft strategy notes that Australian Bureau of Statistics (ABS) data classifies data in ways that create limitations for studies of advanced manufacturing. This is reflected in census data for engineers employed in industries that are "inadequately described." In 2006, across Australia, there were 3,397 engineers who described themselves as employed in an industry that is "inadequately described." This rose slightly to 3,478 in 2001, but shot up to 12,618 in 2016. That is an increase of 9,140 which is a 363% increase on 2011 numbers. If it is assumed that NSW commands roughly one third of the population and economy, this may equate to about 4,200 engineers in NSW. This data suggests that since 2011 many engineers consider themselves to be working in new (or perhaps innovative) industries that defy current classification. The NSW government should attempt to understand this shift to determine if there are effects for advanced manufacturing in NSW. **Conclusion** In the Department's work with key partners to identify the nature of the skills gap in NSW advanced manufacturing, it will be important to consider the market factors that influence the study and career decisions of young people, especially young women. Also recognise that skilled migration is only a stop-gap measure that, with better industry and workforce planning, should become a much less significant component of the skills pipeline. More attention must be paid to ensuring that graduate engineers can secure engineering-related work that enables them to complete essential early career professional formation and therefore develop into the next generation of engineers and engineering leaders. It is also important to recognise that growth in non-traditional sectors of employment for engineers is hidden behind data collection that is inadequate for modern needs. The NSW Government can work with the ABS and others to remedy this issue.
	Scope solutions that will help to minimise skills gap. These may include initiatives such as: Informal workshops and developing tools, including online tools that will assist businesses in advanced		

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	manufacturing, in particular SMES, with the aim to aggregate demand for skills ("skills clustering") (short/medium term); and Investigate coordinating an industry – led mentoring/management capability building program, through formal or informal management training (short term).		
Advanced Processes			
1. Increase the adoption of advanced "smart factory" production techniques	DoI will work with key partners to deliver industry-led – "Industry 4.0" workshops state-wide that are focussed on enhancing state-wide uptake of Industry 4.0 by NSW manufacturers. Workshops will focus on key priority areas including big data/analytics; AI; augmented reality; digital supply chain; and security of things. The focus is on educating industry to lower production costs, creating an environment that fosters innovation.		
	As part of this, NSW Government will deliver: • Training/information seminars and, including training modules for small and medium-sized businesses and tailored workshops for those businesses based in Western Sydney and Regional NSW • An online tool offering firms an "Industry 4.0 readiness check		

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2. Support the creation of customised, high-value goods for global markets	Facilitate keynote speaker series and seminars, featuring national and international manufacturing experts from global markets on global best practice		
Advanced Business Models and Creating Demand			
1. Attract foreign direct investment and grow industry presence	DoI will lead a cross- government effort to encourage international businesses to choose NSW as their Asia-Pacific base by assessing NSW's current competitive position benchmarked against key competitors		
	DoI will lead a cross-government effort to continue to identify and develop precincts and industry clusters in strategic locations across the state		
	DoI will continue to coordinate as well as develop and execute strategic projects state wide that create jobs and contribute to economic growth by revitalising local communities and activating underutilised government land		
2. Globally promote and showcase NSW Advanced Manufacturing capabilities	Working with, Austrade and Business Events Sydney, Promote NSW Advanced Manufacturing to other States and internationally through global showcasing and promoting through business events as well as inbound and outbound trade missions and delegations		

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	DoI establishing a Western Sydney Investment Attractions Office that will focus on attracting investment, increasing trade and creating new jobs to support the growth of globally competitive and sustainable NSW industries, such as Advanced Manufacturing		
3. Make it easier to do business in NSW – Government as a Customer	The Department of Finance, Services and Innovation is currently undertaking a review of NSW Government procurement processes that will examine ways to streamline processes and look increasing participation of NSw businesses, including SMEs, in government procurement processes. This includes identifying an investing in initiatives that improve capabilities of NSW businesses to bid for government work.		

General Comments on KPI's

The 'potential measurement elements' for Key Performance Indicator 8 could be improved with a more explicit link between qualification attainment and employment outcome. To this end, the measurement should be linked to the rate at which graduates with degrees or other qualifications identified for KPI 7 attain employment related to their fields of study. There may also be merit in an associated measurement of the percentage of staff in advanced manufacturing companies that have a STEM-related qualification.